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     CAS/STN FILE 'REGISTRY' ENTERED AT 07:15:30 ON 20 JUL 2005
L1            1  S   SILICON/CN

     FILE 'HCAPLUS' ENTERED AT 07:16:53 ON 20 JUL 2005
L2         3972  S   L1(L)(NANOPARTIC? OR NANOSPHER? OR
                NANOGRA? OR NANOSIZ? OR NANOPELLET? OR NANOPULVER? OR NANOPOWDE
                R? OR POWDER? OR PULVER?)

     FILE 'HCAPLUS' ENTERED AT 07:17:10 ON 20 JUL 2005
L3          309  S   L1(L)GRANUL?
                E NANOPARTICLES/CT
                E E3+ALL/CT
L4         1019  S   NANOPARTICLES/CT(L)(SI OR SILICON)
L5         1412  S   NANOCRYSTALS/CT(L)(SI OR SILICON)
                E LUMINESCENCE/CT
                E E3+ALL/CT
L6       234371  S   (LUMINESCENCE/CT OR "LUMINESCENCE (L)
                IR-INDUCED"/CT OR "STOKES' LAW"/CT OR "IR-INDUCED LUMINESCENCE"
                /CT OR "IR-STIMULATED LUMINESCENCE"/CT OR "ISOTHERMAL LUMINESCE
                NCE"/CT OR "LUMINESCENCE SPECTRA"/CT OR "PERSONOV EFFECT"/CT
                OR PHOTOLUMINESCENCE/CT OR "SHPOL'SKII EFFECT"/CT OR "SORET
                BANDS"/CT OR "SORET SPECTRAL BANDS"/CT OR "STIMULATED LUMINESCE
                NCE"/CT OR "STIMULATED LUMINESCENT EMISSION"/CT OR "VAVILOV'S
                LAW"/CT OR CATHODOLUMINESCENCE/CT OR "EXCITON LUMINESCENCE"/CT
                OR "LUMINESCENCE (L) EXCITON-PHONON"/CT OR "LUMINESCENCE (L)
                MAGNETO-, EXCITON"/CT OR "LUMINESCENCE (L) RECOMBINATION,
                EXCITON"/CT OR "LUMINESCENCE, ELECTRO- (L) EXCITON"/CT OR
                "MAGNETOOPTICAL EFFECT (L) LUMINESCENCE"/CT OR FLUORESCENCE/CT
                OR "EXCIMER FLUORESCENCE"/CT OR "LASER INDUCED FLUORESCENCE"/CT
                 OR "FLUORESCENCE (L) EXCITATION, LASER-INDUCED"/CT OR
                "FLUORESCENCE (L) TWO-PHOTON"/CT OR "POLARIZED FLUORESCENCE"/CT
                 OR "RESONANCE FLUORESCENCE"/CT OR SUPERFLUORESCENCE/CT OR
                "X-RAY (L) FLUORESCENCE"/CT OR "X-RAY FLUORESCENCE"/CT OR
                "X-RAY SPECTRA (L) FLUORESCENCE"/CT OR "IR LUMINESCENCE"/CT OR
                "INFRARED LUMINESCENCE (L) CHEMILUMINESCENCE"/CT OR "INFRARED
                LUMINESCENCE (L) NEAR-IR"/CT OR "LUMINESCENCE (L) NEAR-IR"/CT
                OR "LUMINESCENCE, CHEMI- (L) IR"/CT OR "LUMINESCENCE, BIO-"/CT
                OR "LUMINESCENCE, BIOLUMINESCENCE"/CT OR "LUMINESCENCE, BIO-
                (L) ULTRAWEAK"/CT OR "LUMINESCENCE, CATHODO-"/CT OR "LUMINESCEN
                CE, CHEMI-"/CT OR "LUMINESCENCE, CHEMILUMINESCENCE"/CT OR
                "LUMINESCENCE, CHEMI- (L) ELECTROCHEMI-"/CT OR "LUMINESCENCE,
                ELECTRO-"/CT OR "LUMINESCENCE, ELECTROLUMINESCENCE"/CT OR
                "GUDDEN-POHL EFFECT"/CT OR "LUMINESCENCE, ELECTRO- (L)
                BLUE"/CT OR "LUMINESCENCE, RADIO-"/CT OR "LUMINESCENCE,
                THERMO-"/CT OR MAGNETOLUMINESCENCE/CT OR "LUMINESCENCE (L)
                MAGNETO-, EXCITON"/CT OR "MAGNETOOPTICAL EFFECT (L) LUMINESCENC
                E"/CT OR "MAGNETOOPTICAL EFFECT (L) LUMINESCENCE"/CT OR
                "OPTICAL NONLINEAR PROPERTY (L) LUMINESCENCE"/CT OR PHOSPHORESC
                ENCE/CT OR "PIEZOOPTICAL PROPERTY (L) PIEZOLUMINESCENCE"/CT OR
                "POLARIZED LUMINESCENCE"/CT OR "L
L7          701  S   "PHOTON EMISSION"/CT
L8         5981  S   "LUMINESCENT SUBSTANCES"/CT
L9         3245  S   SCINTILLATION/CT
L10       54248  S   PHOTOLUM?
L11       16177  S   (PHOTO###### OR LIGHT OR IRRADIAT#### OR
                RADIAT#######)(3A)LUMINESC###########
L12        1639  S   (SI OR SILICON)(3A)(NANOSPHER? OR NANOGRANU
                L? OR NANOPELLET? OR NANOPARTIC?)
L13        1080  S   ((L2 OR L3 OR L4 OR L5) OR L12) AND (L6 OR
                L7 OR L8 OR L9 OR L10 OR L11)
L14         805  S   (LUMINESCENT SUBSTANCES OR PHOTOLUM? OR
                LUMINESC#####(L)PHOTO) AND L13
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L15          410 S   L13 AND (HEAT#### OR VCSEL OR LASER OR
                 LASED OR LASING OR LASER OR RADIAT###### OR IRRADIAT#######)
L16            1 S   US2004229447/PN
L17              SEL PLU=ON  L16 1- NCL IC :       2 TERMS
L18         8988 S   L17
L19            4 S   L12 AND L18
L20          121 S   L12 AND PRECURSOR
L21              SEL PLU=ON  L16 1- RN :      13 TERMS
L22            1 S   L13 AND L18
L23      1019444 S   L21
L24          978 S   L13 AND L23
L25            0 S   L22 NOT L16
L26            3 S   L19 NOT L16
L27            3 S   L23 AND L26
                 D ALL HITSTR TOT

     FILE 'STNGUIDE' ENTERED AT 07:37:04 ON 20 JUL 2005

     FILE 'HCAPLUS' ENTERED AT 07:38:49 ON 20 JUL 2005
L28            2 S   L13 AND (SHEATH OR REACTANT)(2A)(GAS OR H2
                 OR H OR HYDROGEN)
L29            9 S   L13 AND (WET OR ACID###)(3A)ETCH#####

     FILE 'REGISTRY' ENTERED AT 07:38:51 ON 20 JUL 2005
L30           34 S   H4SI/MF
L31       163981 S   SILANE
L32           31 S   (HELIUM OR NITROGEN OR ARGON)/CN OR N2/MF
L33         1697 S   CARBON DIOXIDE OR CO2/MF
L34           20 S   (F6S OR F4SI)/MF
L35          257 S   CELLULOSE NITRATE
L36           35 S   FH/MF OR HNO3/MF
L37            1 S   METHANOL/CN
L38            1 S   ISOPROPANOL/CN
L39            1 S   WATER/CN
L40            1 S   HYDROXYL/CN
L41           10 S   HOSI/MF

     FILE 'HCAPLUS' ENTERED AT 07:42:04 ON 20 JUL 2005
L42           35 S   L13 AND L30
L43           77 S   L13 AND L31
L44           92 S   L13 AND ?SILANE?
L45            3 S   L13 AND HYDROSILYL?
L46            3 S   L13 AND SILANI?
L47           30 S   L13 AND (STABILIS? OR STABILIZ?)
L48           56 S   L13 AND SURFACE(3A)(OXID#### OR OXIDI? OR
                 OXIDAT?)
L49           28 S   L13 AND (CO2 OR CARBON DIOXIDE OR C
                 DIOXIDE OR L33)
L50           54 S   L13 AND (INERT OR NOBLE OR N2 OR HE OR
                 HELIUM OR AR OR ARGON)(3A)GAS
L51           84 S   L13 AND L32
L52            6 S   L13 AND L34
L53            1 S   L13 AND L35
L54           37 S   L13 AND L36
L55            8 S   L13 AND L37
L56            2 S   L13 AND L38
L57            9 S   L13 AND L39
L58            0 S   L13 AND L40
L59            0 S   L13 AND L41
L60           15 S   L13 AND (OH OR SIOH OR HYDROXY#####)
L61           32 S   L13 AND SURFACE(5A)(TERMINA###### OR
                 FRAGMENT###### OR SUBSTITUENT OR FUNCTIONAL##### OR GROUPS)
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L62            0  S   L13 AND RTO
L63           44  S   L13 AND DECOMP?
L64          244  S   L13 AND (THERMAL? OR HEAT#### OR RTA OR
                  RTP)
L65           85  S   L13 AND TREAT#######
L66          107  S   L13 AND CONDITION
L67            2  S   L13 AND REACTANT
                  S L13 AND HYDROGEN/CN

     FILE 'REGISTRY' ENTERED AT 07:50:05 ON 20 JUL 2005
L68            1  S   HYDROGEN/CN

     FILE 'HCAPLUS' ENTERED AT 07:50:05 ON 20 JUL 2005
L69       300553  S   L68
L70           62  S   L13 AND L69
L71           71  S   L13 AND VISIBLE SPECTRUM
L72           32  S   L13 AND PEAK####(3A)(EMIT###### OR
                  EMISS#######)
L73           26  S   L13 AND (CO2 OR DIOXIDE)(3A)LASER
L74            0  S   L13 AND L33(L)(LASER OR LASED OR LASING)
L75           11  S   L13 AND (WASH#### OR CLEAN#### OR RINS####)

L76            9  S   L13 AND (FILTER? OR FILTR#####)
L77            0  S   L13 AND CELLULOSE
L78           35  S   L13 AND PRECURSOR
L79           82  S   (L10 OR L11 OR L12 OR L13 OR L14 OR L15)
                  AND (CELLULOSE OR L35)
L*** DEL     341  S L10-15 AND (ORANGE OR READ)(4A)(LIGHT OR EMIT##### OR EMISS##
L80          345  S   (L10 OR L11 OR L12 OR L13 OR L14 OR L15)
                  AND (ORANGE OR READ)(4A)(LIGHT OR EMIT##### OR EMISS###### OR
                  PEAK OR WAVELENGTH OR LAMBDA OR FREQUENCY OR COLOR?)
L81           10  S   L13 AND L80
L82           34  S   L13 AND BRIGHT######
L83           92  S   L13 AND (ISOLATED OR SINGLE OR INDIVIDUAL##
                  # OR SEPARAT#### OR EACH)(3A)(NANOPARTICLE OR SI OR SILICON)
L84          309  S   L13 AND SURFACE
L85          158  S   L13 AND (HYDROGEN OR H2 OR H(3A)GAS)
L86           69  S   (L28 OR L29) OR (L45 OR L46) OR (L52 OR
                  L53) OR (L55 OR L56 OR L57) OR L60 OR L67 OR (L75 OR L76) OR
                  L81
L87           69  S   L86 NOT L26
L88           49  S   L87 AND NANOPARTIC?
L89           50  S   L87 AND PHOTOLUM?
L90           34  S   L88 AND L89
                  D ALL HITSTR TOT
L91         1184  S   (L42 OR L43 OR L44 OR L45 OR L46 OR L47 OR
                  L48 OR L49 OR L50 OR L51 OR L52 OR L53 OR L54 OR L55 OR L56 OR
                  L57 OR L58 OR L59 OR L60 OR L61 OR L62 OR L63 OR L64 OR L65 OR
                  L66 OR L67) OR (L70 OR L71 OR L72 OR L73 OR L74 OR L75 OR L76
                  OR L77 OR L78 OR L79 OR L80 OR L81 OR L82 OR L83 OR L84 OR L85
                  OR L86 OR L87 OR L88 OR L89)
L92         1150  S   L91 NOT (L26 OR L90)
L93            6  S   L92 AND LUMINESCENT MATERIALS
                  D ALL HITSTR TOT
L94          576  S   L92 AND ?LUMINESC?(5A)(NANOS? OR NANOC? OR
                  MESOP? OR NANOG? OR NANOP?)
L95          704  S   L92 AND (SI OR SILICON)(5A)(NANOS? OR
                  NANOC? OR MESOP? OR NANOG? OR NANOP?)
L96          642  S   L92 AND (SI OR SILICON)(5A)?LUMINESC?
L97          547  S   L94 AND L95
L98          518  S   L97 AND L96
L99          105  S   L98 AND (OXIDI? OR OXIDAT?)
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L100          32  S   L98 AND STABILI?
L101          26  S   L98 AND DECOMP?
L102         138  S   L98 AND THERMAL?
L103          31  S   L98 AND HEAT?
L104           2  S   L98 AND ?SILYL?
L105           0  S   L98 AND ?SILANI?
L106           0  S   L98 AND SIOH
L107           0  S   L98 AND OH
L108           3  S   L98 AND HYDROX#####
L109          17  S   L98 AND ACID####
L110          43  S   L98 AND ETCH#####
L111         132  S   L98 AND LASER
L112           0  S   L98 AND SHEATH
L113          27  S   L98 AND BRIGHT#####
L114         119  S   (L94 OR L95 OR L96 OR L97 OR L98) AND
                    ((L100 OR L101) OR (L104 OR L105 OR L106 OR L107 OR L108 OR
                    L109 OR L110) OR L113)
L115           4  S   L114 AND L99 AND (L102 OR L103) AND L111
L116          33  S   L114 AND L111
L117          21  S   L116 AND (L99 OR L102 OR L103)
L118          26  S   (L104 OR L105 OR L106 OR L107 OR L108) OR
                    L115 OR L117
                    D ALL HITSTR TOT
                    S (L30 OR L32-41 OR H2/MF) AND L98

     FILE 'REGISTRY' ENTERED AT 08:10:24 ON 20 JUL 2005
L119          19  S   H2/MF

     FILE 'HCAPLUS' ENTERED AT 08:10:24 ON 20 JUL 2005
L120      365106  S   L119
L121         136  S   (L30 OR (L32 OR L33 OR L34 OR L35 OR L36
                    OR L37 OR L38 OR L39 OR L40 OR L41) OR L120 ) AND L98
L122         120  S   L121 NOT (L118 OR L26 OR L90 OR L93)
L123         112  S   L122 AND ?LUMINESC?(3A)(SI OR SILICON OR
                    POLYSILICON)
                    S L122 AND SILICON/CN

     FILE 'REGISTRY' ENTERED AT 08:12:06 ON 20 JUL 2005
L124           1  S   SILICON/CN

     FILE 'HCAPLUS' ENTERED AT 08:12:06 ON 20 JUL 2005
L125      416381  S   L124
L126         114  S   L122 AND L125
L127           9  S   L122 AND STABILI?
L128          26  S   L122 AND (OXIDI? OR OXIDAT?)
L129           3  S   L122 AND DECOMP?
L130           0  S   L122 AND (?SILANI? OR ?SILYL?)
L131          18  S   L122 AND (SIH4 OR ?SILANE?)
L132           4  S   L128 AND L131
L133          27  S   L127 OR L129 OR L131 OR L132
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//V"

L133 ANSWER 18 OF 27 HCAPLUS COPYRIGHT ACS on STN

AN 1999:389792 HCAPLUS

DN 131:108498

ED Entered STN: 24 Jun 1999

TI Effects of **hydrogen** in the annealing environment on **photoluminescence** from **Si nanoparticles** in SiO2

AU Withrow, S. P.; White, C. W.; Meldrum, A.; Budai, J. D.; Hembree, D. M., Jr.; Barbour, J. C.

CS Oak Ridge National Laboratory, Oak Ridge, TN, 37831, USA

SO Journal of Applied Physics (1999), 86(1), 396-401
CODEN: JAPIAU; ISSN: 0021-8979

PB American Institute of Physics

AB The role of H in enhancing the **photoluminescence** (PL) yield observed from **Si nanocrystals** embedded in SiO2 was studied. SiO2 **thermal** oxides and bulk fused SiO2 samples were implanted with Si and subsequently annealed in various ambients including H or D forming **gases** (**Ar+4%H2** or Ar+4%D2) or pure Ar. Results are presented for annealing at 200-1100°. Depth and concentration profiles of H and D at various stages of processing were measured using elastic recoil detection. H or D is observed in the bulk after annealing in forming gas but not after high temperature (1100°) anneals in Ar. The presence of H dramatically increases the broad PL band centered in the near IR after annealing at 1100° but has almost no effect on the PL spectral distribution. H is found to selectively trap in the region where **Si nanocrystals** are formed, consistent with a model of H passivating **surface** states at the Si/SiO2 interface that leads to enhanced PL. The **thermal stability** of the trapped H and the PL yield observed after a high temperature anneal were studied. The H concentration and PL yield are unchanged for subsequent anneals up to 400°. However, >400° the PL decreases and a more complicated H chemical is evident. Similar concns. of H or D are trapped after annealing in **H2** or D2 forming gas; however, no differences in the PL yield or spectral distribution are observed, indicating that the electronic transitions resulting in luminescence are not dependent on the mass of the H species.

IT Annealing
Luminescence
Nanoparticles
Thermal stability
(effects of **hydrogen** and deuterium in annealing environment on **photoluminescence** from **Si nanoparticles** in SiO2)

IT 7440-37-1, Argon, uses
(annealing in; effects of **hydrogen** and deuterium in annealing environment on **photoluminescence** from **Si nanoparticles** in SiO2)

IT 12385-13-6, Hydrogen(atomic), occurrence 16873-17-9, Deuterium(atomic), occurrence
(effects of **hydrogen** and deuterium in annealing environment on **photoluminescence** from **Si nanoparticles** in SiO2)
nanoparticles in SiO2)

IT **7440-37-1**, Argon, uses
(annealing in; effects of **hydrogen** and deuterium in annealing environment on **photoluminescence** from **Si nanoparticles** in SiO2)

IT 1333-74-0, Hydrogen, processes 7782-39-0, **Deuterium, processes**
(effects of **hydrogen** and deuterium in annealing environment on **photoluminescence** from **Si nanoparticles** in SiO2)

//W"

L118 ANSWER 17 OF 26 **HCAPLUS COPYRIGHT ACS on STN**

AN 2000:329679 HCAPLUS

ED Entered STN: 19 May 2000

TI **Surface**-chemical control of optical quenching processes at porous silicon interfaces: Generation of a stable-selective sulfur-dioxide sensor.

AU Bocarsly, Andrew B.; Wimbish, J. Clint

CS Department of Chemistry, Princeton University, Princeton, NJ, 08544, USA

SO Book of Abstracts, 219th ACS National Meeting, San Francisco, CA, March 26-30, 2000 (2000), COLL-414 Publisher: American Chemical Society, Washington, D. C..
CODEN: 69CLAC

DT Conference; Meeting Abstract

LA English

AB Visible **photoluminescence** from **nanoscopic** particles of **silicon** formed by anisotropic etching of **single** crystal **silicon** is a well-established phenomenon, A consensus appears to be forming that this process is associated with quantum confined states associated with the **Si nanoparticles**. Along with this conclusion, a variety of quenching mechanisms have been reported. Previously we indicated that static quenching via dangling bond **surface** states could be selected by the synthesis of a low quality ultrathin oxide layer on the porous silicon interface. We also demonstrated that such interfaces were selectively quenched by SO2(g). However, the tendency of the oxide interface to further develop in the presence of humid air made the observed quenching process unstable. We now report that, once formed, the Si/SiOx interface can be **stabilized** even in the presence of water at elevated temps. by modification with a **silylfluorocarbon**. This interface is permeable to sulfur dioxide allowing for continued quenching by this species over an extended time period, and making possible a functional sulfur dioxide sensor.

"Y"

L90 ANSWER 22 OF 34 **HCAPLUS COPYRIGHT ACS on STN**

AN 2003:23721 HCAPLUS
DN 138:277780
ED Entered STN: 12 Jan 2003
TI Light-emitting silicon nanocrystals **from laser pyrolysis**
AU Huisken, Friedrich; Ledoux, Gilles; Guillois, Olivier; Reynaud, Cecile
CS Max-Planck-Institut fur Stromungsforschung, Gottingen, D-37073, Germany
SO Advanced Materials (Weinheim, Germany) (2002), 14(24), 1861-1865
CODEN: ADVMEW; ISSN: 0935-9648
PB Wiley-VCH Verlag GmbH & Co. KGaA
DT Journal; General Review
LA English
CC 73-0 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

AB A review. Crystalline **Si nanoparticles** with diams. between 2.5 and 20 nm were prepared by CO2-laser-induced decomposition of silane in a gas flow reactor. A small portion of the products created in the reaction zone is extracted through a nozzle into a high-vacuum apparatus to form a freely propagating mol. beam of clusters and **nanoparticles** that can be deposited on suitable substrates. The strong visible **photoluminescence** (PL) of the Si nanocrystals was studied as a function of their size, and as a function of the time for which they are exposed to air. All observations can be explained from quantum confinement as the only origin of the PL. Chemical methods are exploited to modify the surface of the **Si nanoparticles** and to reduce their size, thus shifting their PL to shorter wavelengths. With this technique, the **Si nanoparticles**, collected in much larger quantities in the **filter** of the flow reactor, can be made strongly luminescent so that they may be used for various applications.

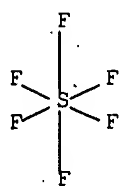
ST review luminescence silicon nanocrystal laser pyrolysis
IT **Luminescence**
  Nanocrystals
  Quantum size effect
    (**light**-emitting **silicon** nanocrystals from laser pyrolysis)
IT Thermal decomposition
    (photo-; light-emitting silicon nanocrystals from laser pyrolysis)
IT 7440-21-3, Silicon, properties
  RL: PRP (Properties)
    (light-emitting silicon nanocrystals from laser pyrolysis)

Micro-Raman
    spectroscopy was used for characterization of the deposits (no data
    given). Laser-driven nucleation in a flow reactor is a powerful technique
    to produce fullerenes and Si quantum dots and other nano-size
    semiconductors or high-temp. evapd. materials.

IT **2551-62-4, Sulfur hexafluoride**
    (**sensitizer** for laser-induced gas phase synthesis of carbon
    and silicon clusters)

RN 2551-62-4 HCAPLUS

CN Sulfur fluoride (SF6), (OC-6-11)- (9CI) (CA INDEX NAME)

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     FILE 'REGISTRY' ENTERED AT 11:50:43 ON 20 JUL 2005
L1             20 S F6S/MF OR F4SI/MF

     FILE 'HCAPLUS' ENTERED AT 11:51:12 ON 20 JUL 2005

     FILE 'HCAPLUS' ENTERED AT 11:51:19 ON 20 JUL 2005
L2            162 S L1(L)(PHOTOSENSIT? OR SENSITIS? OR SENSITIZ?)
L3              0 S L2 AND PHOTOLUM?
L4              7 S L2 AND NANOPART?
L5             92 S L2 AND CO2 LASER
L6              2 S L4 AND L5

     FILE 'SCISEARCH' ENTERED AT 11:53:49 ON 20 JUL 2005
                  E EHBREHT M, 1996/RE

     FILE 'SCISEARCH' ENTERED AT 11:53:59 ON 20 JUL 2005
                  E EHBRECHT M, 1996/RE
L7              6 S E4-6 AND LASER?
L8              2 S L7 AND NANO#######
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Jeff Harrison
Team Leader, STIC-EIC2800
JEF-4B68, 571-272-2511

L6 ANSWER 2 OF 2 HCAPLUS COPYRIGHT ACS on STN

AN 1996:704301 HCAPLUS

DN 126:24344

TI Deposition and analysis of carbon and **silicon clusters** generated by **laser-induced gas phase reaction**

AU Ehbreht, M.; Ferkel, H.; Husken, F.; Holz, L.; Polivanov, Yu. N.; Smirnov, V. V.; Stelmakh, O. M.

CS Max-Plank Institut fur Stromungsforschung, Goettingen, 37073, Germany

SO Proceedings of SPIE-The International Society for Optical Engineering (1996), 2778(Pt. 1, 17th Congress of the International Commission for Optics, **1996**, Pt. 1), 171-172
CODEN: PSISDG; ISSN: 0277-786X

PB SPIE-The International Society for Optical Engineering

DT Journal

LA English

AB Laser driven gas-phase synthesis in a flow reactor was employed for the prodn. of C and Si cluster beams starting from gaseous compds. It is based on a **CO2-laser**-induced decompn. of mol. gases contg. C and Si, such as C2H2 and **SiH4**. By introducing a skimmer into the reaction zone, the generated clusters are transferred to the free mol. flow and analyzed with a time-of-flight mass spectrometer. These clusters were deposited on a Si or sapphire target at room temp.